

In the Drawings

Please replace Sheets 1 and 2 of the drawings on file with the Replacement Sheets submitted herewith containing Figs 1a, 1b, 2a, and 2b.

For the Examiner's convenience, marked up versions of the Replacement Sheets are also provided to show the changes that have been made.

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REMARKS

We believe that This is a full and complete reply to the Office Action dated July 6, 2005.

Drawings

Corrected Replacement Sheets of drawings sheets have been provided in compliance with 37 CFR 1.21(d). In particular, Applicant has included cross-hatching below the lines in Figs. 1a, 1b, 2a, and 2b for which there is not an attached number to indicate the lines correspond to the surface of the ground.

Abstract

The abstract heading has been corrected as suggested by the Examiner.

Specification

The title has been replaced with a new title that is commensurate with the invention to which the claims are directed.

Figure 4 under the BRIEF DESCRIPTION OF THE DRAWINGS has been corrected as Figures 4a-4c.

Claims

Claims 1, 3, 7, 12, 14, 16, 17 and 20 are currently amended. Claims 2, 4-6, 8-11, 13, 15, 18, 19, and 21-26 remain as filed.

Rejection under 35 U.S.C. §103(a)

Claims 1, 2, 14, 16, 20, 21, 24, and 25 were rejected as being unpatentable over Wesson (US patent no. 6,336,506) and Abbott-Brown (US patent no. 6,173,783), and further in view of Hutchison (US patent no. 3,559,739).

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Applicant has amended independent claims 1, 14 and 20, which are the only independent claims, to more clearly define the invention for which protection is sought. In particular, these claims now include the feature that the low density foam is injected substantially immediately after igniting the propellant. Support for the added feature is found in specification, for example, at paras [0008] and [0017].

Claims 1 and 14 also now include the feature that the foam is injected from the tubing string through a port in the tubing string positioned above the propellant carrier, and claim 20 also now includes the feature that the means for injecting foam from the tubing string is positioned above the propellant carrier. Support for this feature is found in the specification, for example, at paras [009], [010], and [020]. Claims 3, 7, 12, 16, and 17 have been amended to improve their form.

As relating to original claims 1, 14, and 20, the Examiner states that Wesson teaches a method and apparatus for treating a wellbore by running in a tubing string into the wellbore to position a propellant carrier adjacent the openings; overbalancing the wellbore to establish hydrostatic pressure on the formation; and igniting the propellant so as to produce a pressure event and a volume of gas into the formation. Further, the Examiner states that Hutchison teaches the injection of low-density foam through the tubing string to produce at least some debris and conveying the debris from the wellbore by circulating the foam out of the wellbore to the surface until sufficient debris is removed.

As relating to original claim 7, of which some matter is now incorporated into new claims 1, 14 and 20, the Examiner states that Huber teaches in the abstract a port in the tubing string above the propellant carrier.

As relating to original claim 2, the Examiner states that Abbott-Brown teaches a method of overbalancing a wellbore by filling the tubing with liquid.

Applicant submits that the claims as amended are not obvious in light of the prior art. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion or motivation to do so found in either the references

themselves or in the knowledge generally available to one of ordinary skill in the art. Further, the fact that references can be combined or modified or that the claimed invention is well within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish prima facie obviousness.

Wesson is directed to an apparatus and method employing a propellant and pressurized gas for perforating and stimulating a subterranean formation which is penetrated by a wellbore. Wesson notes that in the prior art, overbalancing the wellbore to a sufficient pressure will fracture the formation in the vicinity of the perforations and that particulate material or proppants are conventionally injected into the perforations so as to prop open and extend the fractures (col 1, lines 34-63). Wesson then teaches directing pressurized gas, generated by burning a propellant sleeve, to enter the formation to clean the perforations of debris and also extend the fractures (col. 7, lines 25-41). Wesson further teaches that a proppant such as sand may be introduced into the well, which is carried into the fractures to abrade or scour the walls of the fractures to enlarge the conduits for fluid flow and to prop the fractures open (col 7, lines 42-58). Wesson does not in any way contemplate removal of debris from the wellbore.

Hutchison is directed to the use of continuous foam circulation to remove sand and/or produced fluids from a wellbore by injecting low density foam out of a lower end of a tubing string positioned in the wellbore. In particular, Hutchinson teaches a method and apparatus for continuously circulating foam in a well through a segmented tubing string while the tubing string is being made up or broken up. Hutchison only contemplates the use of continuous foam circulation during well cleanout or drilling operations. Hutchison does not in any way contemplate perforation or the use of foam circulation in the context of perforation.

Huber is directed to a downhole valve for use in a tubing-conveyed string of tools in a wellbore, with the wellbore having a packer positioned above the valve to form a rathole below the packer. The valve is said to be particularly useful when opened in conjunction with the detonation of a perforating gun for overbalanced or underbalanced well perforation. More particularly, the valve

includes ports for flowing fluids between an interior passage of the valve and the rathole. Under either underbalanced or extreme overbalanced conditions, the valve is opened substantially immediately before the perforating gun is detonated to cause a sudden reduction or increase, respectively, in rathole pressure (col. 4, lines 9-33). In the case of an extreme overbalanced condition, the sudden increase in pressure causes the rathole fluids to enter the subsequently perforated casing and fracture the formation to stimulate the formation for enhanced production. Huber does not in anyway contemplate the removal of debris from the wellbore.

Abbott-Brown is directed to a method for completing and producing hydrocarbons in a well through the use of extreme overbalanced pressure during perforation of the casing string, followed by an underbalanced surge to produce the hydrocarbons through the tubing string. This is achieved by sealing a portion of the annulus between the casing and tubing string with a packer, pressurizing the annular space below the packer to achieve a predetermined pressure that will exceed the fracture gradient of the formation for perforation of the casing, followed by releasing of the pressure below the packer to allow hydrocarbons flowing from the perforations to surge into the string. Abbott-Brown does not in any way contemplate removal of material from the wellbore other than via the tubing string, nor the use of artificial lift to remove material from the wellbore.

Claims 1-19:

With respect to independent claims 1 and 14, none of the prior art teach or suggest injection of foam substantially immediately after igniting a propellant. The injection of the foam substantially immediately after igniting the propellant is an important feature of the invention which permits the debris to be produced from the formation and into the wellbore by lowering the hydrostatic pressure, with the debris being conveyed to the surface by circulating the foam out of the wellbore. Further, none of the prior art teach or suggest injection of low density foam from a port or means in the tubing string above the propellant carrier. Therefore, as none of the prior art references provide these elements, a combination

of the prior art fails to provide all the features of the invention and on this basis the invention cannot be obvious.

Further, Applicant respectfully disagrees with the Examiner that there is a motivation for combining the references. In particular, the examiner states that the motivation for the combination of these references is that Hutchison permits maintaining continuous circulation during such makeup or breakup-normal circulation down the tubing string and up the well annulus or reverse circulation down the well annulus and up the tubing string. Applicant's invention is not concerned with the makeup or breakup of tubing string, but rather is directed to the removal of debris from a wellbore after stimulation with a propellant. From the perspective of one skilled in the art, the ability of Hutchison to maintain continuous circulation during makeup or breakup has no relevance to stimulation with a propellant. Therefore, the motivation asserted by the Examiner does not lead in any way to the Applicant's invention as claimed.

Even further, Applicant submits that it is not obvious to modify any of the prior art to produce the claimed invention. In particular, Wesson forcefully injects pressurized gas through perforations and into the formation upon burning the propellant to clean and extend fractures to stimulate well production. The flow is therefore into the formation, and not into the wellbore; therefore, it is unlikely that the debris will enter the wellbore, and certainly debris is not removed. Further, there is no discussion of removal of debris from the wellbore. Overall, use of foam to produce debris from the formation and to remove the debris from the wellbore is contrary to the teachings of Wesson. Consequently, no motivation exists to modify Wesson to produce the claimed invention.

In the case of each of Huber and Abbott-Brown, it would be required to remove the packer to permit foam injected into the wellbore to be conveyed up the wellbore, as claimed. Removal of the packer would destroy the function for which each of Huber and Abbott-Brown was intended, which is to stimulate flow of production fluid and direct production up the tubing, such that no motivation exists to modify either Huber or Abbott-Brown to produce the claimed invention.

Finally, as Hutchison is concerned only with make-up and break up of tubing such as during drilling or well clean up operations, and is not concerned with stimulation. Consequently, there is no motivation to add a propellant carrier onto the lower end of the tubing and to enable the foam to produce debris from the wellbore after stimulation with a propellant.

Applicant therefore submits that the rejection as it applies to claims 1 and 14, and all claims depending therefrom, is unsupported by the art and should be withdrawn.

Claims 20-26:

With respect to independent claim 20, none of the prior art references teach or suggest a means for injecting and circulating foam substantially immediately after the propellant is ignited, Further, none of the prior art teach or suggest injection foam at a location above the propellant carrier. Therefore, as none of these references provide these elements, a combination of the prior art fails to provide all the features of the invention and on this basis the invention cannot be obvious.

Further, Applicant respectfully disagrees with the Examiner that there is a motivation for combining the references and submits that it is not obvious to modify any of the prior art to produce the claimed invention, as established for claims 1-19 above.

Applicant therefore submits that the rejection as it applies to claim 20, and all claims depending therefrom, is unsupported by the art and should be withdrawn.

Rejection under 35 U.S.C. §103(a)

Claims 13 and 15 were rejected as being unpatentable over Wesson, Abbott-Brown, and Hutchinson as applied to claims 1 and 14 above and further in view of Leniek, Sr. (US 2001/0004937).

Applicant submits that as claims 13 and 15 depend on patentable claims, this objection is moot.

Rejection under 35 U.S.C. §103(a)

Claims 6, 11-12, 22-23, and 25-26 were rejected as being unpatentable over Wesson, Abbott-Brown, and Hutchinson as applied to claims 1 and 20-21, and further in view of Scott III (US 5,441,110).

Applicant submits that as claims 6, 11-12, 22-23, and 25-26 depend on patentable claims, this objection is moot.

Rejection under 35 U.S.C. §103(a)

Claim 7 was rejected as being unpatentable over Wesson, Abbott-Brown, and Scott, III as applied to claims 1 and 6, and further in view of Huber (US 5,865,254).

Applicant submits that as claim 7 depends on patentable claims, this objection is moot.

Rejection under 35 U.S.C. §103(a)

Claims 3-5 were rejected as being unpatentable over Wesson, Abbott-Brown, and Hutchinson as applied to claim, and further in view of Kawabata (US 5,888,021).

Applicant submits that as claims 3-5 depend on patentable claims, this objection is moot.

Rejection under 35 U.S.C. §103(a)

Claims 8-10 were rejected as being unpatentable over Wesson, Abbott-Brown, and Hutchinson, Scott, III and Huber as applied to claims 1, 6, and 7, and further in view of Kawabata.

Applicant submits that as claims 8-10 depend on patentable claims, this objection is moot.

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Rejection under 35 U.S.C. §103(a)

Claims 17-19 were rejected as being unpatentable over Wesson, Abbott-Brown, and Hutchinson, Scott, III and Leniek, Sr. as applied to claims 14-16, and further in view of Kawabata.

Applicant submits that as claims 17-19 depend on patentable claims, this objection is moot.

Double patenting

Claims 1-13 were provisionally rejected under the doctrine of obviousness-type double patenting as being unpatentable over claims 1-12 of copending Application No. 10/650,709 in view of Abbott-Brown (US 6,173,783).

Claims 14-26 were provisionally rejected under 35 U.S.C. §101 as claiming the same invention as that of claims 13-25 of copending Application No. 10/650,709.

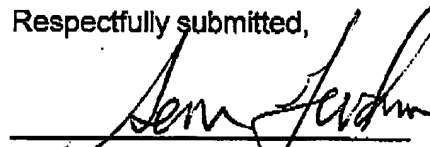
Applicant has elected to permit copending Application No. 10/650,709 to abandon by not responding to the office action dated June 30, 2005 by the extendible due date of December 30, 2005. The double patenting rejections are therefore moot and Applicant respectfully requests that the rejections be withdrawn at the appropriate time.

CONCLUSION

It is believed that all of the Examiner's the objections have been addressed and reconsideration and allowance of claims 1-26 is respectfully requested.

Respectfully submitted,

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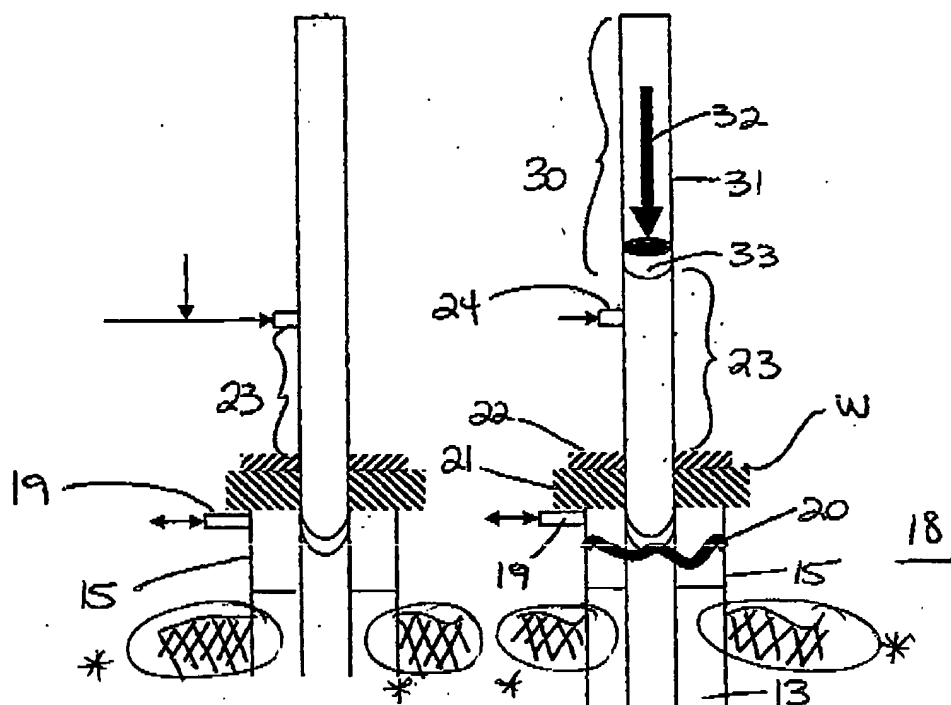


Fig. 1b

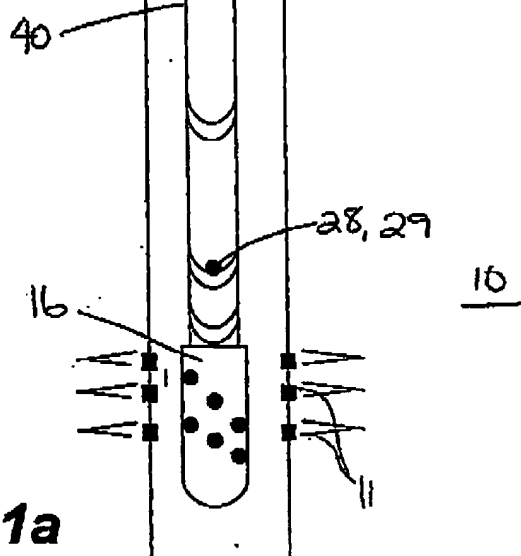


Fig. 1a

